UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,247	09/16/2005	Hiroshi Fukuda	NITT.0250	8762

38327 7590 03/31/2009

REED SMITH LLP
3110 FAIRVIEW PARK DRIVE, SUITE 1400
FALLS CHURCH, VA 22042

EXAMINER	
LEE, KYOUNG	
ART UNIT	PAPER NUMBER
2895	
MAIL DATE	DELIVERY MODE
03/31/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/523,247	FUKUDA ET AL.	
	Examiner	Art Unit	
	KYOUNG LEE	2895	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15,17-19 and 22-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *17,19,22-24,26 and 29-37* is/are allowed.

6)☒ Claim(s) *1-8, 10-15, 18, 25, and 27-28* is/are rejected.

7)☒ Claim(s) *9,12 and 13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 January 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/27/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 1/27/2005 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Objections

Claims 12 and 13 are objected to because of the following informalities:

In claim 12, Applicants recite "a developer by **de-oprotectiion** reaction". The examiner suggests replacing to "a developer by **de-protection** reaction".

In claim 13, Applicants recite "or a **damacin** wiring pattern". Appropriate correction for the word **"damacin"** is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 7-8, 10-11, 25, and 27-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Kihara et al. (US Patent No. 6,197,473).

[Re claim 1] Kihara discloses the method comprising the steps of: preparing a substrate; forming, on said substrate, a photosensitive organic film having molecules

not polymers as a main component having on the periphery thereof a plurality of polarity change reaction groups for controlling solubility with respect to a developer; and transferring a hole pattern or a gate pattern to said photosensitive organic film (see column 3 line 65 through column 18 line 21); [Re claim 2] wherein said photosensitive organic film includes an acid generation group for generating acid by exposure (see column 7 lines 18-25); and [Re claim 3] wherein said photosensitive organic film includes a thermal cross-linker, which is heat treated after said pattern has been transferred (column 18 lines 22-29).

[Re claim 4] Kihara also discloses the method comprising the steps of: preparing a substrate; forming, on said substrate, a photosensitive organic film having molecules not polymers as a main component for embracing or connecting at least part of acid generation molecules including an acid generation group, including four or more reaction sites which are polarity change reaction groups for controlling solubility with respect to a developer; and transferring a hole pattern or a gate pattern to said photosensitive organic film; [Re claim 5] wherein said acid generation group includes a phenyl group (see column 3 line 65 through column 18 line 21); [Re claim 7] wherein said photosensitive organic film is heat treated while ultraviolet light or an electron beam is emitted after said pattern has been transferred; [Re claim 8] wherein said photosensitive organic film includes a thermal cross-linker, and is heat-treated after said pattern has been transferred (see column 18 lines 11-29); [Re claim 10] wherein a plurality of said polarity change reaction groups are provided on the periphery of said molecules not polymers (see column 3 line 65 through column 17 line 49); and [Re

claim 11] wherein said molecules not polymers includes, as main constituting elements, at least one of cyclodextrine, calixarane, multi-nuclear phenol, dendrimer, fullerene, crown ether, androsteron, and silicon monomer-oligomer, or one of the induction elements thereof (see column 4 lines 44-65).

[Re claim 25] Kihara also discloses the method comprising the steps of: preparing a substrate; forming, on said substrate, a photosensitive organic film which subjects at least part of an acid generation molecule including an acid generation group to clathrate or combination, and which, as main components, molecules having a defined molecular weight of 5000 or less including a reaction site which is a polarity change reaction group for controlling solubility with respect to a developer, and transferring a hole pattern or a gate pattern to said photosensitive organic film (see column 3 line 65 through column 18 line 21).

[Re claim 27] Kihara also discloses the method comprising the steps of: forming a pattern by using a radio sensitive chemical compound which includes four or more defined reaction groups which generate a polarity conversion reaction by an acid catalyst, and an acid generator having, as main components, molecules having a defined molecular weight of 5000 or less, and a weight ratio of 10% or more (see column 3 line 65 through column 18 line 21).

[Re claim 28] Kihara also discloses the method comprising the steps of: forming a pattern by using a radio sensitive chemical compound which includes an acid generation group generating an acid catalyst by irradiation of radiation, and, as main

components, molecules having a defined molecular weight of 5000 or less including four or more defined reaction groups generating a polarity conversion reaction by an acid catalyst; wherein an acid generator molecule including said acid generation group is made clathrate in said molecule, or said acid generation group is combined to said molecules (see column 3 line 65 through column 18 line 21).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6, 12-15, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kihara et al. (US Patent No. 6,197,473).

[Re claim 6] Kihara discloses the method wherein said transferring is carried out using an energy beam (see column 18 lines 11-21) but, the applied reference fails to disclose the selection of "a wavelength of 193 nm or less". However, it would have been obvious to one of ordinary skill in the art at the time of the invention because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges or a result

effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

[Re claim 12] Kihara discloses the method comprising the steps of: preparing a substrate; forming, on said substrate, a photosensitive organic film which includes an acid generation group for generating acid by exposure, and molecules not polymers whose molecular weight is 5000 or less being main components, a plurality of said groups being provided on the periphery of said molecules, and which controls solubility with respect to a developer by de-protection reaction of a hydroxy group protected by a protection group; and transferring a predetermined pattern to said photosensitive organic film using an energy beam (see column 3 line 65 through column 18 line 21). However, the applied reference fails to disclose the selection of "a wavelength of 193 nm or less". However, it would have been obvious to one of ordinary skill in the art at the time of the invention because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges or a result effective variable, which do not

overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

[Re claim 13] Kihara also discloses the method wherein said predetermined pattern is a hole pattern or a damacin wiring pattern; [Re claim 14] wherein at least part of an acid generation molecule including said acid generation group is made clathrate or combinatory to said molecules not polymers; [Re claim 15] wherein said acid generation group includes a phenyl group; and [Re claim 18] wherein said predetermined pattern is a gate pattern or a wiring pattern (see column 3 line 65 through column 18 line 30).

Allowable Subject Matter

Claims 17, 19, 22-24, 26, 29-37 are allowed.

The following is an examiner's statement of reasons for allowance: Claim 17 is allowable because of the prior art, either singly or in combination, fails to anticipate or render obvious, the method, including step of forming, on said substrate, a photosensitive organic film which includes an acid generation group for generating acid by exposure, molecules not polymers whose molecular weight is 5000 or less being a main component, and which carries out control of solubility with respect to a developer by lactone forming reaction at a plurality of reaction sites provided on the periphery of

said mother nuclear molecules or pinacol transition reaction; and transferring a predetermined pattern to said photosensitive organic film using an energy beam having a wavelength of 193 nm or less. These features in combination with the other elements of the claim are neither disclosed nor suggested by the prior art of record.

The following is an examiner's statement of reasons for allowance: Claim 22 is allowable because of the prior art, either singly or in combination, fails to anticipate or render obvious, the method, including step of forming, on said substrate formed with the dielectric film, a photosensitive organic film which subjects at least part of an acid generation molecule including an acid generation group to clathrate or combination, and which has a polarity change reaction group for controlling solubility with respect to a developer, and molecules having a defined molecular weight of 5000 or less; transferring a predetermined pattern to said photosensitive organic film; and etching said dielectric film with said photosensitive organic films used as a mask to form an opening pattern. These features in combination with the other elements of the claim are neither disclosed nor suggested by the prior art of record.

The following is an examiner's statement of reasons for allowance: Claim 23 is allowable because of the prior art, either singly or in combination, fails to anticipate or render obvious, the method, including step of forming, on said substrate formed with a dielectric film, a photosensitive organic film which subjects clathrate or combination at least part of an acid generation molecule including an acid generation group to clathrate or combination, and which has a polarity change reaction group for controlling solubility with respect to a developer, and molecules having a defined molecular weight of 5000

or less being a main component; transferring a predetermined pattern to said photosensitive organic film; and etching said metal film or semiconductor film with said photosensitive organic films used as a mask to leave an island-like pattern. These features in combination with the other elements of the claim are neither disclosed nor suggested by the prior art of record.

The following is an examiner's statement of reasons for allowance: Claim 24 is allowable because of the prior art, either singly or in combination, fails to anticipate or render obvious, the method, including step of forming a photosensitive organic film which subjects at least part of an acid generation molecule including an acid generation group to clathrate or combination, being smaller in dimension than the width of a transition region in which probability for acquiring solubility changes from 0.1 to 0.9, and which has, as a main component, molecules having a defined molecular weight and including a reaction site which is a polarity change reaction group for controlling solubility with respect to a developer; and transferring a hole pattern or a gate pattern to said photosensitive organic film. These features in combination with the other elements of the claim are neither disclosed nor suggested by the prior art of record.

The following is an examiner's statement of reasons for allowance: Claim 26 is allowable because of the prior art, either singly or in combination, fails to anticipate or render obvious, the method, including step of forming a pattern by using a radio sensitive chemical compound which includes an acid generation group that generates an acid catalyst by irradiation of radiation, and which has, as main components, molecules having a defined molecular weight of 5000 or less including four or more

defined reaction groups which generates a polarity conversion reaction by said acid catalyst; wherein an average distance (a reciprocal of cube root of reaction group concentration) between said reaction groups is 1% or less of the minimum dimension of the pattern formed on said substrate, and an average distance (a reciprocal of cube root of acid generation group concentration) between acid generation groups which generates said acid catalyst by irradiation of radiation is 3% or less of said minimum dimension. These features in combination with the other elements of the claim are neither disclosed nor suggested by the prior art of record.

The following is an examiner's statement of reasons for allowance: Claim 32 is allowable because of the prior art, either singly or in combination, fails to anticipate or render obvious, the method, wherein said radio sensitive chemical compound is a radio sensitive chemical compound having, as main component, molecules having a defined molecular weight of 5000 or less including a reaction group generating a polarity conversion reaction by an acid catalyst; and wherein an average distance (a reciprocal of cube root of acid concentration) between acid catalysts generated by the irradiation of radiation is 5% or less of the minimum dimension, and a diffusion length internally of the radio sensitive chemical compound thin film from the irradiation to development of said acid catalyst is 1% or less of the minimum dimension, or the reaction number necessary for changing solubility of one molecule is 4 or more. These features in combination with the other elements of the claim are neither disclosed nor suggested by the prior art of record.

Claims 19, 29-31 and 33-37 depend from claim 17, 26, or 32 so they are allowable for the same reason.

Claim 9 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowable subject matter: Claim 9 is allowable because of the prior art, either singly or in combination, fails to anticipate or render obvious, the method, wherein said photosensitive organic film is developed using a super critical fluid after said pattern has been transferred. These features in combination with the other elements of the claim are neither disclosed nor suggested by the prior art of record.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KYOUNG LEE whose telephone number is (571)272-1982. The examiner can normally be reached on M-F 8:30AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew N. Richards can be reached on (571) 272-1736. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kyoung Lee/
Examiner, Art Unit 2895

/N. Drew Richards/
Supervisory Patent Examiner, Art Unit 2895